

CLAIMS

1. A method for synchronizing timing in a broadband switch, the method comprising:

5 synchronizing a plurality of line cards for transceiving
information packets; and
synchronizing a plurality of switch cards controlling the
distribution of the information packets, in response to communications
with the line cards.

10 2. The method of claim 1 further comprising:
from the plurality of switch cards, designating a master
switch card, having a master switch timing reference, and slave switch
cards; and

15 wherein synchronizing a plurality of line cards includes
synchronizing line cards to the master switch timing reference in response
to communications with the master switch card.

20 3. The method of claim 2 further comprising:
from the plurality of line cards, designating a master line
card and slave line cards; and

wherein synchronizing a plurality of switch cards in response
to communications with the line cards includes synchronizing the slave
switch cards to the master switch timing reference in response to
communications with the master line card.

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4. The method of claim 3 wherein synchronizing a plurality of switch cards in response to communications with the line cards includes establishing communications exclusively between the switch cards and the line cards.

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5. The method of claim 3 wherein synchronizing line cards to the master switch timing reference in response to communications with the master switch card includes prohibiting communications between the line cards.

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6. The method of claim 3 wherein synchronizing line cards in response to communications with the master switch card includes:

receiving timing signals at the master switch card from each
15 of the line cards; and
sending timing corrections from the master switch card to each of the line cards.

7. The method of claim 6 wherein receiving timing
20 signals at the master switch card from each of the line cards includes the master switch card receiving a timing signal including a local timing reference from each of the line cards.

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8. The method of claim 7 wherein sending timing corrections from the master switch card to the line cards includes:

comparing the local timing reference from each line card to the master switch timing reference;

5 creating a timing offset between each local timing reference and the master switch timing reference;

the master switch card supplying each timing offset to its respective line card; and

each line card modifying its local timing reference in
10 response to receiving its respective timing offset.

9. The method of claim 8 wherein synchronizing the slave switch cards to the master switch timing reference in response to communications with the master line card includes:

15 each slave switch card receiving a timing signal, with a local timing reference synchronized to the master switch timing reference, from the master line card; and

each slave switch card synchronizing its respective slave switch timing reference to the received local timing reference.

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10. The method of claim 9 wherein each switch and line section generates a timing reference that is the overflow count in the cyclical generation of a first predetermined number at a first predetermined rate;

wherein designating a master switch card having a master switch timing reference includes using the master switch card overflow count as the master switch timing reference;

wherein comparing the local timing references from each line cards to the master switch timing reference includes comparing the master switch count to each of the line card overflow counts;

wherein creating a timing offset between each local timing reference and the master switch timing reference includes measuring the difference between each line card overflow count and the master switch card count;

wherein supplying timing offsets to each of the respective line cards includes supplying each line card with the differences between its respective overflow count and the master switch card count; and

wherein each of the plurality of line cards modifying its local timing reference in response to receiving its respective timing offset includes each line card adding the its respective overflow count difference to its count.

11. The method of claim 10 wherein each slave switch card receiving a timing signal, with a local timing reference synchronized to the master switch timing reference includes each slave switch card receiving a signal with an overflow count synchronized to the master switch count; and

wherein each slave switch card synchronizing its respective slave switch timing reference to the received local timing reference

includes each slave switch card synchronizing its respective count to the master line card overflow count.

12. The method of claim 9 further comprising:
5 initializing the line and switch cards;
initializing the master switch card master switch timing
reference; and
wherein synchronizing the slave switch cards includes
synchronizing the line cards to the initialized master switch card master
10 timing reference.

13. The method of claim 9 further comprising:
following the synchronization the plurality of switch cards,
turning off the master switch card,
15 selecting an alternate switch card as the master switch card
from the plurality of slave switch cards;
maintaining the master switch timing reference with the
alternate master switch card; and
wherein synchronizing the plurality of line cards includes
20 maintaining the synchronization of the line cards using the alternate
master switch card master switch timing reference.

14. The method of claim 9 further comprising:
following the synchronizing of the plurality of switch cards,
turning off the master line card,
selecting an alternate line card as the master line card from
5 the plurality of slave line cards;
maintaining the synchronization of the alternate master line
card timing reference to the master switch card clock; and
wherein synchronizing the plurality of switch cards includes
maintaining the synchronization of the slave switch cards to the alternate
10 master line card.

15. A system for synchronizing switch timing, the system
comprising:
a plurality of line cards, each line card having an information
15 port to transmit and receive information packets and a control port to
accept commands for controlling the distribution of the information
packets, each line card maintaining synchronization in response to timing
signals communicated through the control port; and
a plurality of switch cards, each switch card having a control
20 port connected to the plurality of line cards to send information packet
control commands, each switch card maintaining synchronization in
response to timing signal communications with the line cards through the
control port.

16. The system of claim 15 wherein the plurality of switch cards include a master switch card, having a master switch timing reference, and slave switch cards; and

wherein the line cards maintain synchronization in response
5 to timing signal communications with the master switch card.

17. The system of claim 16 wherein the plurality of line cards include a master line card and slave line cards; and

wherein the slave switch cards maintain synchronization in
10 response to timing signal communications with the master line card.

18. The system of claim 17 wherein the switch card control ports are connected exclusively to line card control ports.

15 19. The system of claim 17 wherein the master switch card receives timing signals from each of the line cards, and sends timing corrections to the line cards.

20 20. The system of claim 19 wherein the master switch card receives a timing signal including a local timing reference from each of the line cards.

21. The system of claim 20 wherein the master switch card compares the local timing reference from a line card to the master
25 switch timing reference, creates a timing offset between the local timing

reference and the master switch timing reference, and supplies the timing offset in a timing signal to the line card; and

wherein the line card modifies its local timing reference in response to receiving the timing signal with the timing offset from the master switch card.

22. The system of claim 21 wherein each slave switch cards receives a timing signal, with a local timing reference synchronized to master switch timing reference, from the master line card, with each slave switch card adopting the local timing reference of the master line card as the slave switch timing reference.

23. The system of claim 22 wherein each switch card includes a counter to generate a timing reference that is the overflow count of a first predetermined number at a first predetermined rate;

wherein each line card includes a counter to generate a timing reference that is the overflow count of a first predetermined number at a first predetermined rate;

wherein the master switch card uses its overflow count as the master switch timing reference, compares its count to each line card overflow count, measures the difference between each line card overflow count and the master switch count, and supplies each line card its respective measured difference as the timing offset; and

wherein each line card adds its respective measured difference to its counter.

24. The system of claim 22 wherein the line cards are initialized;

wherein the switch cards are initialized;

wherein the master switch card counter is initialized; and

5 wherein the line cards are synchronizing with timing signal communications responsive to the initialized master switch card counter.

25. The system of claim 22 further comprising:

wherein the master switch card is turned off after

10 synchronizing the line cards;

wherein an alternate switch card is selected as the master switch card from the plurality of slave switch cards, and maintains the master switch timing reference; and

15 wherein the plurality of line cards maintain synchronization in response to timing signal communications with the alternate master switch card.

26. The system of claim 22 wherein the master line card is turned off after synchronizing the slave switch cards;

20 wherein an alternate line card is selected as the master line card from the plurality of slave line cards, and maintains synchronization with the master switch card; and

wherein the slave switch cards maintain synchronization in response to timing signal communications with the alternate master line
25 card.

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